MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WASTE AND HAZARDOUS MATERIALS DIVISION

RADIOLOGICAL PROTECTION NOTICE 95-1:
Potential For Thallium-201 Contamination Of Treadmills And Rooms Used For Thallium Cardiac Stress Tests.

Issued under authority of Part 135 of Act 368, P.A. 1978.

Addressees:

All medical facilities using radioactive materials in Michigan.

Purpose:

This notice is to alert medical facilities using radioactive materials about the potential for significant levels of thallium-201 contamination of treadmills and rooms used for thallium cardiac stress tests. It is expected that medical facilities will evaluate their use of such material and will act appropriately to reduce the potential for radioactive contamination and to prevent the spread of such contamination.

Description of Circumstances:

During a recent inspection at a Michigan medical facility, a U. S. Nuclear Regulatory Commission (NRC) inspector discovered significant thallium-201 contamination (>50,000 cpm) on and around a treadmill in the cardiology department. Prior to that discovery, the facility had not performed an end-of-day survey and was unaware of the levels and extent of the contamination. The following three paragraphs are excerpted from a letter the NRC subsequently mailed to the director of the medical facility:

> An area of concern regarding a failure to perform an end-of-day survey was also identified. On the day of the inspection (Wednesday), the inspector found high levels of radioactive thallium-201 contamination in the cardiology department's treadmill room. Contamination on a shoe of one of your employees was also identified. Contamination was not detected in the hallway outside the room. The contamination resulted from a spill during a stress test which was performed the preceding Monday.
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> We are concerned that the treadmill area was not surveyed, as required by your procedures, at the end of the day on Monday. We remind you that these surveys are done, in part, to prevent the spread of contamination. It was extremely fortuitous that the thallium contamination apparently did not spread throughout your facility since it was discovered so late after the spill. Therefore, in your response to this letter, please also include for this concern: (1) an analysis of the root cause of the problem, (2) the corrective steps that have been taken and the results achieved, and (3) the steps that will be taken to avoid further problems.
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> This failure to perform an end-of-day survey after the administration of thallium is not being cited as a violation of NRC requirements since the State of Michigan, and not the NRC, regulates the use of accelerator-produced radiopharmaceuticals such as thallium. However, the State of Michigan has been notified of this incident.

Discussion:

As correctly pointed out by the NRC, the regulation of accelerator-produced radioactive materials, like thallium-201, is the responsibility of the State of Michigan. Within the State of Michigan, the Department of Environmental Quality, Waste and Hazardous Materials Division is the responsible authority for such regulation. Requirements pertaining to the use of state-controlled radioactive materials are printed in Michigan's *Ionizing Radiation Rules*. A booklet containing these Rules should be readily available for reference in all medical facilities using accelerator-produced radioactive materials.

This recent incident, and several earlier ones, indicate that contamination can occasionally occur during thallium stress tests. Furthermore, with a half-life of about 74 hours, contaminated surfaces will remain contaminated for a relatively long time if not decontaminated. It is, therefore, important that medical facilities have appropriate radiation safety measures in place that will (1) quickly detect the presence of contamination and (2) prevent its spread.

Requirements and Recommendations:

Each facility performing cardiac stress tests using thallium-201 is expected to ensure that the following contamination-related testing and activities are being performed and that the contamination limits outlined below are met:

1. Pursuant to requirements of Rule 221, each facility shall make or cause to be made such surveys as may be necessary to establish compliance with the Rules.

Surveys should at a minimum be done as follows and in compliance with facility procedures:

A. Survey the treadmill and room area carefully at the end of each day using appropriate instrumentation, such as a portable GM survey instrument with thin window detector. Perform multiple "end-of-day" surveys on those days when unplanned tests are performed after an end-of-day survey.

B. Survey the treadmill and room area carefully after each thallium procedure during which the risk of contamination is judged to be higher than normal, such as after difficult cases or when a spill is suspected.

C. Keep records documenting the survey levels and locations of contamination.

2. Set limits for the level of acceptable contamination. Limits shall comply with Rules 237, 201, and 272. In addition, limits should not exceed the following:

Total Residual Surface Contamination (dpm/100 cm^2)			
Average	Maximum	Removable (room and equipment)	Removable (skin and clothing)
5,000	15,000	1,000	Nothing Detectable

As used in the above table, dpm (disintegrations per minute) is determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation. Furthermore, the following qualifications pertain to the use of this table:

- Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.
- The average and maximum dose rates associated with surface contamination of the room or equipment should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm measured through not more than 7 mg/cm^2 of total absorber. The dose rate associated with nonremovable contamination of skin and clothing should not exceed 0.1 mrad/h.
- The maximum contamination level applies to an area of not more than 100 cm^2.
- The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area, and the entire area should be wiped.

3. Establish decontamination procedures and other immediate actions to prevent the spread of contamination when limits for contamination are exceeded.

4. Perform periodic wipe or smear tests of the treadmill and room areas likely to become contaminated in the event of a spill or other incident involving the administration of thallium-201. These tests should be performed in accordance with facility procedures and at least weekly and whenever survey measurements indicate the presence of contamination.

Response:

No written response is required by this notice. However, if you have any questions, comments, or additional concerns regarding this matter, please contact us at:

Mailing Address	Contact	Telephone Numbers
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